

Montana Weather/Precipitation Summary

August 2016 NOAA's National Weather Service Great Falls Montana

During August, a westerly flow aloft predominated over Montana (Fig. 1). Temperatures were below normal southeast and below normal elsewhere. Precipitation was above normal over southeast Montana, and northwestward toward Glacier National Park. August's winds were slightly above the long-term average.

Statewide composite temperatures averaged 0.8°F below normal for the month. The red line on the graph to the right shows the cumulative 12-month departure from normal. The temperature anomalies ranged from -3.6°F at Joliet to +0.3°F at Libby (Fig. 2). The warmest average monthly temperature was 74.1°F at Broadus, and the coolest was 49.7°F at Placer Basin SNOTEL. This was the 51st coolest August of record. For the past 12-months, the statewide composite average temperature is 2.8°F above normal. Nine of the last 12 months and 20 of the past 24 months have had warmer than normal temperatures.

The monthly departure from normal for precipitation across Montana is shown in Figure 3. Below normal precipitation values covered much of southwestern and northeastern Montana. The highest rainfall amount recorded was 3.80-inches at Flattop Mountain. A value of 3.52-inches was measured in Great Falls. Statewide, this month averaged 0.87", or 0.33" below normal. The statewide composite precipitation for the past 12 months is 0.41" above normal. The green line on the graph to the right shows the cumulative 12-month departure from normal. Eight of the past 12 months have measured above normal precipitation.

The statewide average winds were slightly stronger than normal in August, but ranked as the 25th calmest August of record. The statewide composite average was 8.3 mph, 0.2-mph above normal. The brown line of the graph to the right shows the 12-month cumulative statewide wind departure from normal. The 12-month average is running 0.1-mph below average. Six of the past 12 months have had above normal average speeds. The fastest average speed was 12.8 mph at Deep Creek RAWS. Strong winds behind a cold front produced gusts to 74 mph at Two Medicine on the 22nd.

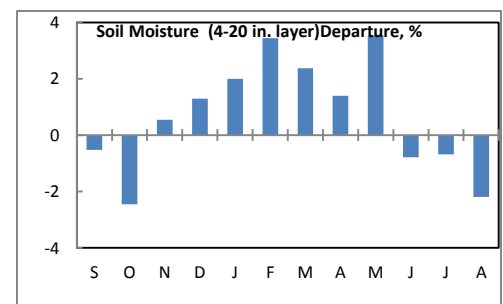
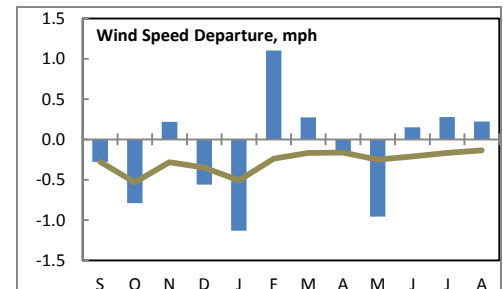
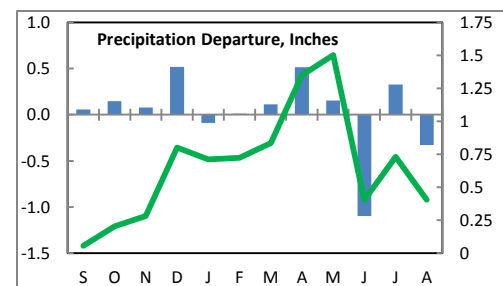
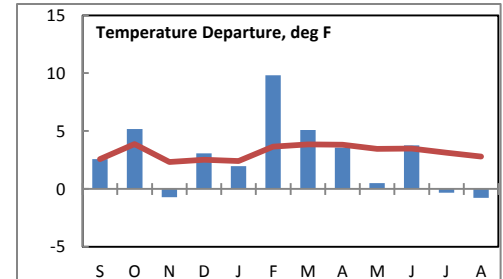
Composite statewide soil moisture continued below normal for August. The average of 13.8-percent is 2.2 points below the 22-year average of 16.0-percent. This is the second lowest August value since 1995. August 2015 was the lowest.

Refer to NEIC's State of the Climate report for the latest monthly discussion:

<http://www.ncdc.noaa.gov/sotc/>

Aug 1-14

Temperatures averaged mostly below normal for the first two weeks of August. There were some very warm days, along with cool nights. Severe weather occurred on a regular basis as well. Two inch hail fell in Prairie County on the 2nd. Severe thunderstorms produced gusts to 65 mph near Sula and 62 mph at Ennis on the 6th. On the 7th, more widespread severe weather occurred over



the state. Gusts to 62 mph were reported near Lindsay (Divide), and 66 mph at Townsend. Flooding and quarter sized hail also occurred at Townsend. On the 9th, widespread severe weather occurred again. Hail to 2.75-inches fell near Ekalaka, with 4-inch hail reported near Ridgeway. Other large hail fell west of Bynum (1.5-inch). Heavy rain fell in the Great Falls area with flooding over the city. Rain fell at rates exceeding 2 inches per hour. Early in the morning of the 10th, 1-inch hail fell over the city, while heavy rain fell near Logan Pass in Glacier National Park. On the 14th, severe weather struck Baker again this summer. Wind gusts to 70 mph were reported. Meanwhile 1-inch hail fell near Flowing Wells (McCone) and west of Cut Bank.

Aug 15-17

A short warm and dry period occurred, with temperatures in the 90s.

Aug 18-19

A rainy period with cooler temperatures occurred across the state. Some severe weather was also reported. Rainfall amounts over 2-inches were seen over southeastern Montana. The third hail storm of the summer hit Great Falls early on the 18th. Up to 2-inch hail fell over portions of the city (Fig. 4). The three hailstorms that hit Great Falls all occurred during the overnight hours, and all had golf-ball size or greater. The climatological record would indicate that this is a first.

Aug 20-31

After a cooler period, temperatures returned above normal by the 27th. An unseasonably windy period on the 22nd produced gusts to 74 mph at Two Medicine. This is their strongest gust of record for August. High temperatures reached the 90s over many parts of the state on the 29th and 30th. Several fires burned across western and southwestern Montana at the end of the month. Scattered thunderstorms produced some strong winds across central Montana on the evening of the 31st. A semi tanker was blown over near Stanford, while gusts reached near 50 mph.

Precipitation/convection

Severe convective weather occurred on 8 days in August, which is normal for the month. There have been 44 severe weather days for the season, six above normal.

Water Year

The temperature was 44.9°F or 2.8°F above normal. This has been the warmest water year since 2000 and the 9th warmest of record.

The composite precipitation was 14.21-inches, 0.36" inches above normal. This was the 58th wettest water year to date, and the wettest since 2014.

Winds averaged 8.9 mph, the 17th calmest of record, and 0.1 mph below normal.

Summer season (Jun-Aug)

For the summer season, temperatures averaged 65.9°F, of 0.9°F above normal. This was the 54th warmest such period of record. The state's highest temperature was 106°F at Brandenburg and Powderville on July 22. The lowest temperature was 20°F at Elk Park on June 7th and August 25th.

The mean precipitation was 4.01, or 1.10 below normal. This is the 31st driest summer period of record for the state. The highest precipitation amount for the summer was 10.49" at Saco, with the lowest 1.21" at Grant.

Winds averaged 8.5-mph, which was 0.2-mph above normal. This was the 30th calmest summer period of record, but the windiest summer since 2004. The highest wind gust was 116 mph near Roy on June 10th. This was the highest gust in the state since April 2014, and the highest June and summer gust since 1995.

August summary information:

High Temperature	102°F at Brandenburg, Fort Howes & Moorhead (2 nd)	Greatest Precip	3.52" at Great Falls City
Low Temperature	20°F at Elk Park (25 th)		3.80" at Flattop Mtn SNOTEL
Warmest Ave Temp	74.1°F at Broadus	Peak Wind Gust	74 mph at Two Medicine (22 nd)
Coollest Ave Temp	49.7°F at Placer Basin SNOTEL		
Range of Temp departures	-3.6°F at Joliet to +0.3° at Libby	Highest Ave Wind	11.6 mph at Sweet Grass 15.0 mph at Deep Creek RAWS
21 city mean monthly Temperature/Normal	66.0/66.8F 0.8F below normal. 51 th coolest of record (since 1880). 38 th percentile. Oct-Aug 44.9/42.1 2.8F above normal. 9 th warmest of record.	20 city mean monthly wind speed/Normal	8.3 mph/8.1 mph; 35 th windiest of record (since 1936). 43 rd percentile. Oct-Aug 8.9 mph/9.0 0.1-mph below normal. 17 th calmest of record.
22 city mean monthly precipitation/Normal	0.87"/1.20" – 73% of normal. 27 th driest of record (since 1880). 37 th percentile. Oct-Aug 14.21"/13.85" - 0.36" above normal. 58 th wettest of record.		

**Historical Rank of Precipitation (inches)
for the Current Month and Water Year to Date**

Location	Aug	% of Norm	Rank	Pcntl	Oct 1 – Aug 31	% of norm	Rank	Pcntl	Years
Baker	1.54	159%			12.97	124%			18
Billings	1.67	196%	13	11	10.20	76%	64	57	112
Belgrade	1.11	103%	34	42	11.64	90%	48	60	79
Butte	0.66	49%	64	52	8.80	75%	97	79	122
Cut Bank	1.17	101%	46	41	10.56	110%	46	42	108
Dillon	0.12	11%	62	80	7.61	79%	57	75	76
Glasgow	0.52	42%	69	57	18.64	174%	3	2	116
Great Falls	1.12	71%	48	38	14.40	108%	43	34	124
Havre	1.24	112%	44	32	15.42	153%	14	10	136
Helena	0.92	77%	49	35	7.90	78%	113	82	137
Jordan	0.49	41%			12.72	111%			18
Kalispell	1.08	109%	45	36	16.27	104%	32	26	122
Lewistown	1.76	102%	40	33	15.88	102%	58	48	120
Livingston	1.16	105%	45	39	12.60	93%	59	53	110
Miles City	0.77	85%	66	47	11.92	105%	65	46	139
Missoula	0.28	23%	88	64	11.59	89%	78	60	130
Mullan Pass	T	0%	66	86	44.99	123%	14	18	74
Wolf Point	0.73	57%			13.28	119%			18
Glendive	0.65	47%	67	55	13.05	106%	48	42	114
Sidney	0.89	77%	29	37	12.04	92%	43	56	76
BZN-MSU	0.87	61%	71	51	15.32	84%	88	67	131

Rankings and Percentiles are 1=driest, higher numbers=wetter.

For an automated version of this chart, updated daily, go to

<http://www.wrh.noaa.gov/tfx/dx.php?wfo=tfx&type=&loc=products&fx=PCPNTOTALS>

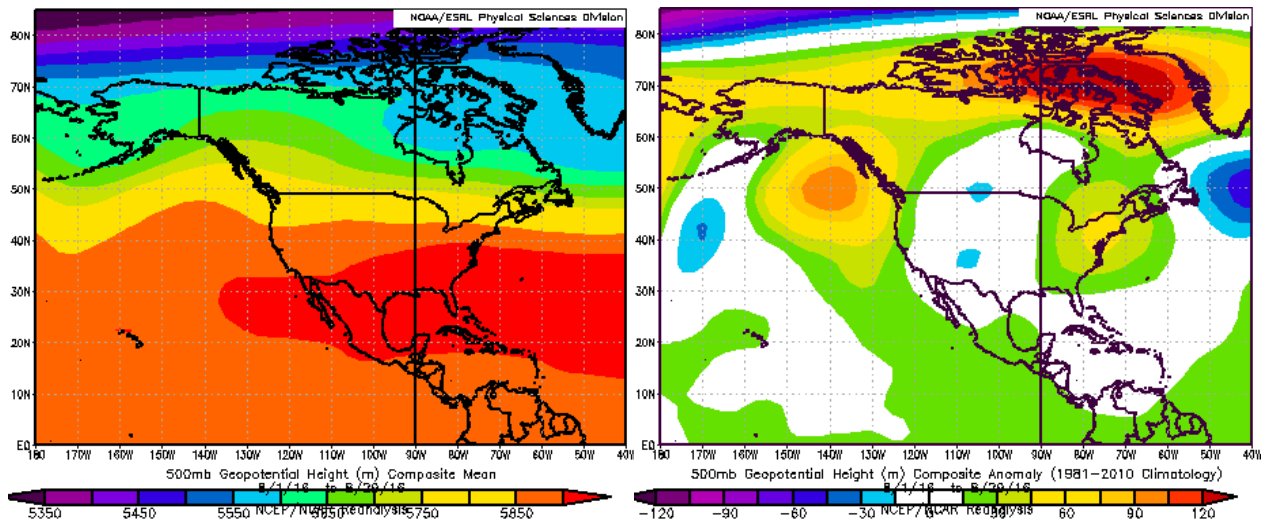


Figure 1. Mean flow at 500 millibars (~18,000 ft) for this month (left) and departure from normal (right).

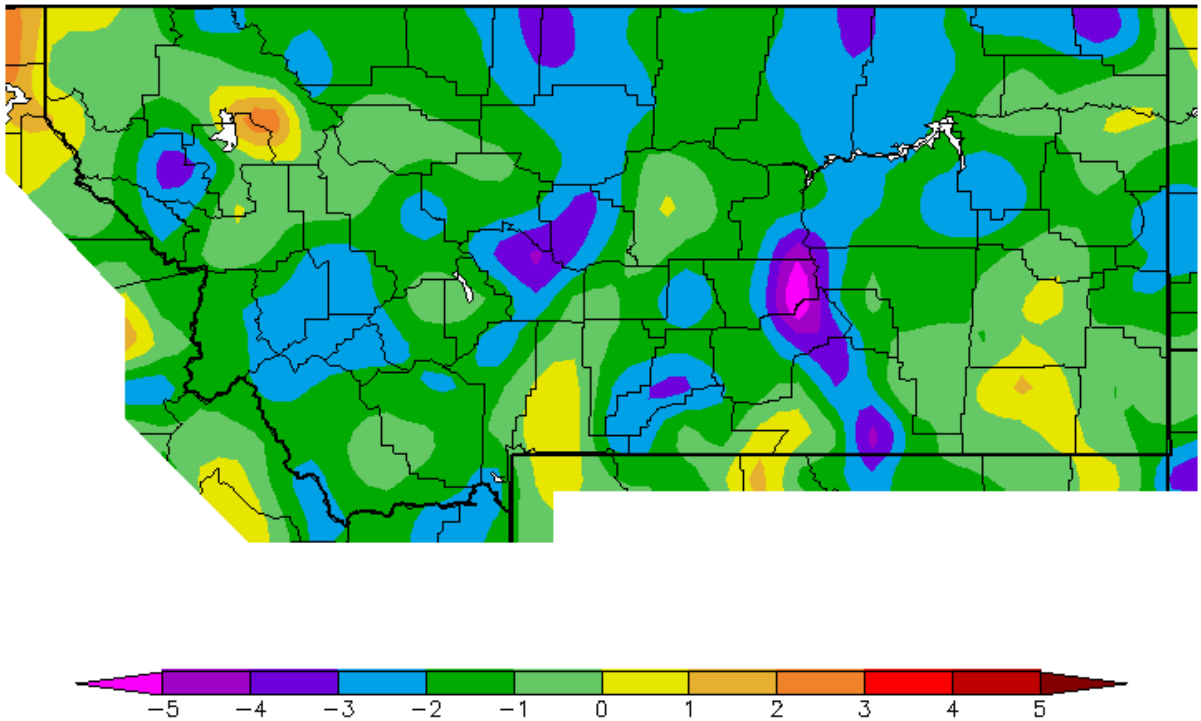


Figure 2. August 2016 temperature departures from normal (°F) (Western Region Climate Center).

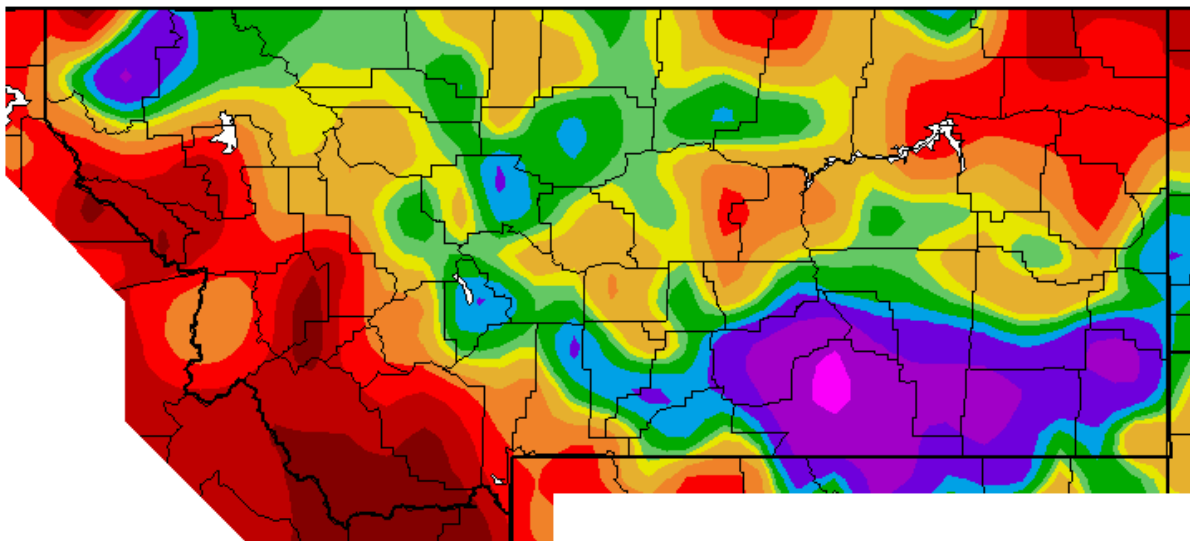


Figure 3. August 2016 precipitation departures from normal (percent) (Western Region Climate Center).



Figure 4. Hail in Great Falls August 18, 2016.

For a state map of % of normal water year precipitation (updated around the 7th of each month), go to:
<http://www.wrh.noaa.gov/tfx/climate/monthlysum/climatesum.php?wfo=tfx>

For the latest information on mountain snowpack from the NRCS, go to: <http://www3.wcc.nrcs.usda.gov/snow/index.html>

For the latest U.S. Drought Monitor, issued weekly by the National Drought Mitigation Center, USDA and NOAA, go to:
<http://droughtmonitor.unl.edu/>

These data are preliminary and have not undergone final QC by NEIC. Therefore, these data are subject to revision. Final and certified climate data can be access at the National Environmental Information Center (NEIC) <http://www.ncdc.noaa.gov>. Many more links are on the Drought Information Page of the NWS Great Falls web site at <http://www.wrh.noaa.gov/tfx/main/drought.php?wfo=tx>. The climatological record for normals is 1981-2010. The ranking period for temperature, precipitation and snowfall is since 1880. The ranking period for wind speeds is since 1936. The ranking period for soil moisture is since 1995.